

Music, Geometry, and the Listener

Space in The History of Western Philosophy and Western Classical Music

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Writing about music is like dancing about architecture...¹

¹ Attributed to Elvis Costello, in an interview by Timothy White entitled "A Man out of Time Beats the Clock", *Musician*, No. 60 (October 1983), p. 52, URL=<<http://www.pacifier.com/~ascott/they/tamildaa.htm>>, accessed 9/6/2008.

ABSTRACT

This thesis is directed towards a philosophy of music by attention to conceptions and perceptions of space. I focus on melody and harmony, and do not emphasise rhythm, which, as far as I can tell, concerns time rather than space.

I seek a metaphysical account of Western Classical music in the diatonic tradition. More specifically, my interest is in wordless, untitled music, often called ‘absolute’ music. My aim is to elucidate a spatial approach to the world combined with a curiosity about the nature of the Pythagorean intervals. Thus one question I seek to answer is: What do the Pythagorean intervals import to music? In their original formulation by Pythagoras, and further, by Plato, their import seemed mystical and analogous to a ‘harmony of the spheres.’ In this spatial approach, the Pythagorean intervals are indicative of infinite depth.

The faculty of hearing alone does not ordinarily spatially locate sources. Hearing is ordinarily combined with sight in order to spatially locate a sound. Yet we talk about music as if it were spatially located, that is, as if it were a visible object with a surface and themes or ‘objects’. I explore the faculty of vision and consider in what ways the processes of vision might be similar to and distinct from audition. My source for this approach is David Marr’s book *Vision* and his theory of the 2 1/2-dimensional sketch.

In a medium in which there is no spatial location, it is important to situate the listener. Newton solved the problem of location by demonstrating the effects of gravity. P. F. Strawson claims that an analogy of distance is required in hearing to situate the listener, that is, a sense of *nearer to* and *further from* a source or object that permits a perception of distance. I claim that in music, the key signature and the scalar relations of musical themes provide this analogy of distance.

The works of Plato, Aristotle, Descartes, Leibniz, and Newton are studied for their accounts of motion, bodies, and space. From these metaphysicians can be gleaned elements of music that include form, motion, timbre, dynamics, and attraction. By incorporating motion, I aim to show that although we may not know the true nature of space, we can learn from hearing music that space is perceptible in other than three dimensions.

I certify that the substance of this thesis has not already been submitted for any degree and is not currently being submitted for any other degree or qualification.

I certify that any help received in preparing this thesis, and all sources used, have been acknowledged in this thesis.

Signature

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Introduction

In this thesis I will consider a single genre of music, classical music in the Western diatonic tradition. Within this genre I will further restrict my focus to a single category of classical music called ‘absolute’ music. ‘Absolute’ music in this tradition is solely instrumental music, without reference to a narrative or drama external to the assembly of tones. I ask the reader to note that when I use the term ‘music’ in this thesis, I am referring to absolute music in this Western tradition, unless otherwise specified. Composers who wrote in this genre include Bach, Brahms, Beethoven, all of whom were based in Europe and composed generally between the 17th and 19th centuries.

The focus of this thesis is on the cognitive perception of absolute music. I have selected this genre of music in the Western tradition for a single, overall reason. Primarily, absolute music offers listeners a challenge: to listen to and make a sound judgement of abstract, complex structures, harmonies, and themes without the familiarity of words to situate or habituate perception. By reconsidering the parameters of judgements of value in hearing performances of classical music, I hope to provide the grounds for accepting the challenge that is offered in this respected, complex, and valuable tradition of Western music.¹

Generally speaking, the aim of this thesis is not to pursue a theory of *all* aspects of classical music. In this thesis I will not pursue an account of rhythm or patterns of metre in music. Metric patterns easily alter ordinary perception and may

¹ There are many genres of Western and global music worthy of study. The tradition of absolute music in the Western classical music tradition is one of the great, complex traditions that continues to impress many listeners in the public forum.

serve to veil otherwise clear cognition.² Further, on the one hand, there has been considerable research on the kinaesthetic relations between rhythm and the human body in 21st century thought. On the other hand, there has been a paucity of research performed on hearing music and the ordinary listener, and in particular, on the spatial relations of tones and their relation to the perception of music. My interest is to increase awareness of our capacity to access, process, and discuss music cognitively by means of a metaphysical account of music, in order to engage critics, pedagogues, performers, and listeners in discourse on music at a greater philosophical level of understanding.

This is not to claim that the limits of hearing put forth in this thesis could not be applied to other music; to apply this philosophical approach to other music would require further research beyond the extent of this thesis. There is an enormous array of styles and genres of music throughout the world. The history of Western music alone is a considerable course of study. It is beyond the scope of this thesis to include all of these topics. For example, to address North Indian classical music in the method adopted throughout this thesis would require a breadth of understanding of Western and Indian metaphysics, and in particular, infinite time, that is over and above the limits of work for this particular researcher at this time, and is work that can be addressed in the future.

Further research into 20th century Western music by this spatial method might also prove fruitful, including composers such as Messiaen, Stockhausen, Xenakis, and Ligeti. The distinction I make in this approach is that I have chosen to address the

2 'Music induces an arousal effect, predominately related to the tempo. Slow or meditative music can induce a relaxing effect; relaxation is particularly evident during a pause. Music, especially in trained subjects, may first concentrate attention during faster rhythms, then induce relaxation during pauses or slower rhythms.' Bernardi, L., Porta, C., Sleight, P., 'The Sound of Silence is Music to the Heart' in *Heart*, BMJ Publishing Group & British Cardiovascular Society, 92, No.4, April, 2006, <http://www.google.com/search?client=safari&rls=en-us&q=the+sound+of+silence+is+music+to+the+heart&ie=UTF-8&oe=UTF-8>, accessed 19/2/2009.

listener's experience, rather than the composer's or performer's intentions and expectations. I have positioned the listener's experience within a philosophical context by provide an initial groundwork in the field of analytic philosophy, and in particular, metaphysics and music.³

This thesis challenges mainstream musical thought in which critics and theorists seek a theory of perception derived from the musical surface, the expressive abilities of the performers, the structural approach adopted by the composer and the conductor, and the context in which the particular composer created a particular work. Absolute music in the Western classical tradition is often described in concert program notes and biographies of composers as arising from a composer's personal experience, his sense of challenge, or an emotion or feeling. Likewise, a musician's performance is often scripted around personal experience, a sense of excitement or inspiration particularly evident in virtuosic performance, and a feeling or emotion. Classical music also affects the listener, but there are questions concerning exactly how this happens (see quote §3.4, p.40). While the content of the listening experience can be described by aesthetic properties, these are often linked to notions of place. A problem arises in clarifying this link between place and the assignment of properties in music. Are aesthetic properties expressed in the music itself or, on the other hand, are they aroused in the listener? At the present time, there has been no resolution to this thorny problem. I aim to argue that the listener has an intrinsic capacity to judge performances of music without recourse to images of place. I claim that music perception, that is, the aural experience of musical motion and cadence, is experienced spatially. I affirm that aesthetic properties can be applied to music, but such properties are gained by a grasp of the success of the overall performance

³ Some philosophers will disagree. Malpas, for example, finds an analytic approach unjustified and parochial.

dependent upon the clarity of the timbre of the music offered. This is within the experience of the ordinary listener, even though he may be unfamiliar with the issues of Western harmony, music history, and the details of a given work.

This lack of a resolution in ordinary music perception is telling on the position of absolute music in the present-day context. Classical, orchestral music in the Western diatonic tradition barely stands alone as an independent form of art, unlike sculpture, painting, and film, for example. More and more, other forms of art integrate music into their species of communication in order to enhance their particular style of addressing the world. Music has much to offer those who want to approach it seriously. In this thesis I offer new questions for consideration in a philosophical account of music. I claim that a spatial approach to hearing music, as will be argued throughout this thesis, serves to release listeners from a passive perceptual position dependent on the emotions to one in which hearing music brings with it a new, or perhaps a renewed level of inquiry and experience.

In listening to music, the assumption is that the listener is already inclined towards, and searches for, ‘agreement’ with the music. I claim that hearing music requires an objective stance, more appropriate to philosophy, in which the listener hears ‘what-is’. In hearing music, I contend that the listener is emotionally *separate* from the music and *separate* also from the intentions of the composer. By destabilising the pre-conceived notions of musical understanding, my aim is to find what is reliable and effective about the perception of ‘absolute’ music by exploring the links between philosophical conceptions of space and music.

In music, it is rarely claimed that metaphysics is a ground for understanding; my aim is to address this lacuna in a philosophical discussion. Metaphysics is a speculative discipline within the field of philosophy. It concerns viable systems of

explanation about the nature of objects in space and time and their relation to science. Metaphysical speculation concerns differing ideas as to the nature of space. To the ancient Greeks, space defied concise definition and remained a vague notion, despite their acknowledgement of its importance; to the rationalists, modern notions of choric space are separate from the perceiver and described by laws of geometry and physics; to the empiricists, space is relative, consisting of the motions of bodies and parts of bodies, and is best described by attention to place (*topos*).

A metaphysical account of music and space is appropriate to address theories of music perception and aesthetics. I acknowledge that at present there is a considerable body of discourse about music that is aimed at the level of the emotions, but I maintain that this fails to investigate music itself. It is my contention that there is not sufficient importance given to simply *hearing* music, and situating *that* experience itself before its emotional content. Ordinarily we lay claim to space having three dimensions, and to the matrix in which we live having an additional dimension of time. We think of space as that ‘in’ which events occur. Objects move ‘through’ space. We require an intrinsic sense of distance to negotiate a path through ordinary phenomena such as traffic jams and supermarkets. A sense of space, including *nearer to* and *further from*, orders our experience. This thesis develops the study of space through the Pythagorean intervals fundamental to the construction of the musical scale, geometry, and the study of bodies in motion. I find that the qualities of space which music describes are geometric *and* kinematic. I trace the history of geometric and kinematic orderings of space in a history of the Western philosophy of science. I further suggest that hearing music spatially requires an awareness of the reassessment of spatial location.

Ordinarily, aural perception assists us in bringing to mind the image of that which produced a sound. My claim is that the practice of visually locating what is heard in a concert ought to be avoided if a listener chooses to *hear* music more completely.⁴ That is, a listener may choose to limit the visual information coming to his brain in a desire to enhance his sensitivity to the aural information. For example, to enhance aural information, a listener might train his eyesight onto a bland pattern during the extent of the music, such as courses of bricks or wooden floorboards, and consciously direct his attention to the music. I agree with my interlocutors that this is not an ordinary method of spatial location; however, I would argue that this practice is justified when one considers that music is a form of art, and the listener is challenged to gain and process as much from the listening experience as he can.

I will limit the practise described above to hearing as discussed in P. F. Strawson's thought experiment in his book *Individuals: An Essay in Descriptive Metaphysics*, in which a listener would not ordinarily spatially locate the sounds he hears. Strawson argues that aural space is unfolding in a way that visual space is not; and further, that hearing alone does not ordinarily import three-dimensional space. He suggests that there is no space (No-Space), in the ordinary sense of three-dimensional spatial location, to the medium in which we hear. I follow this argument through on musical grounds. My claim is that hearing classical music imports alternative dimensions of space to listening experience. I will argue that the intervals of the musical scale import a phenomenological sense of *nearer to* and *further from*; I claim that the perfect Pythagorean intervals are relations of infinite depth inherent to the diatonic scale itself.

⁴ I adopt a different point of view on hearing to Nudds and Hamilton in this statement.

Philosophy often unfolds by levels of discussion. The first level of my account of a revised perception of music arises from a phenomenological approach to hearing. I claim that ‘absolute’ music communicates to us without language, and that we ought to consider our response to it, that is, the experience of hearing it, with restrictions on our language as well. Thus I propose a reflexive account of hearing music, in which the technical aspect of the approach is phenomenological. In a quest for the essence of a relationship between the perceiver and the perceived, a phenomenological account brackets experience from both interpretations of that experience and peripheral qualities of the perceived object. I look to David Marr’s book *Vision: A Computational Investigation into the Human Representation and Processing of Visual Information* as an initial point of departure. I ask the reader to note that my account of hearing is related to, but not the same, as Marr’s theory of vision. Marr’s inquiry into vision is a phenomenological, processual account of visual perception and the algorithms that lead to an accurate image of an object. Having developed his theory from observations of the house fly in ‘pursuit-tracking’, Marr show that vision begins with a raw, primitive sketch or collection of intensities, leading to what he describes as an internally perceived, 2-1/2 dimensional ‘sketch’ that is prior to sight in three dimensions. I aim to show that the concept of perception in 2-1/2 dimensions of a shape is well suited to hearing music. I claim that the motion intrinsic to the act of focussing in vision is an argument for focussing in hearing as well. The challenge to the listener is to sustain the activity of focussing hearing without expectation of a cadence, i.e., agreement in 3-dimensional space.

Secondly, I will explore also timbre in a spatial account of hearing music. Ancient metaphysicians envisaged the musical scale to be indicative of theories of planetary relations in a grand ‘harmony of the spheres’. The projection of an

underlying intelligible order to space and experience in space infused the study and practice of physics and metaphysics in the West for centuries to follow. The attention to rational methods of dividing space, such as the proofs and axioms of Euclidean and other sorts of geometry, has not faded, and remains a central element in the study of physics and the laws of nature. In this thesis I find that the history of concepts of infinite, planetary space is warranted for a developing concept of timbre. Infinite, ‘absolute’ space is the space of geometry; it is also an assumption to be made by the listener in order for musico-spatial relations in 2 1/2 and 3 dimensions to become clear.

Finally, I show that the cognitive perception of the Pythagorean intervals is a correlative of the cognitive perception of depth in infinite space. I explore this spatial conception of infinite depth not as a matter of fact pertinent to musical analysis, but as an approach to the ‘ineffability’ of music. My ultimate aim is to demystify, at least in part, the ineffability of ‘absolute’ music by injecting a metaphysical account of ‘absolute’ space into a phenomenological approach to listening and the kinematic/geometric relations at the musical surface.

Thus, to combine these fundamental points, my contention is that in the process of musical perception, that is, in the process of completing the aural sketch by the internal understanding of the cognitive listener, listening to music is the act of hearing sounds that are not located in an ordinary spatial sense. The number of dimensions dedicated to hearing music in aural, perceptual space, avoiding any information from audio-visual location, is 2-1/2 and 3-dimensional space, in accord with Marr’s account of process and perception.

A critical account of music encompasses material familiar to theorists and students of music. Such accounts include some of these basic important points: the mechanical physics involved in the production of sound and its general reception in an enclosed venue; the dynamics of the process of interaction as the music progresses; the difference in responses of informed / uninformed listeners; and whether music is ‘about’ something, or ‘for’ a purpose. I explore these important discussions and offer a spatial account of music as the most elegant theory of explanation.

The philosophers selected for this study in music in Chapter 2 through to Chapter 6 rarely wrote on this topic, if at all. They have been chosen either for the fundamental appeal of their metaphysics, or for the applicability of their physics and metaphysics to music. Areas of inquiry include the structure of space, that is, its fixed or relative nature; the role of place in relation to space; and whether space is infinite or contained. I will look to five metaphysicians in Western philosophy, Plato, Aristotle, Descartes, Leibniz and Newton, and explore their theories of space. The reader is led to reflect on the ancient relation between music and geometry, music and its relation to the soul, the role of the overtone series and dynamics in the nature of the tone, and, finally, the later relation of music and ‘absolute’ space in Newtonian mechanics.

I will present an evolving understanding of space, motion, and bodies in the history of the philosophy of science, beginning with Plato’s distrust of motion and change, and moving on to the evolution of physics in Aristotle’s causal account of motion and dynamics. Plato and Aristotle established the opposite poles of space and place in their accounts of *chora* and *topos*. Galileo’s discovery of inertia informs the latter half of the thesis that includes Descartes’ account of the immaterial mind and extended space, as well as Leibniz’s dynamics. My inquiry into the relation of music

and motion is completed by a study of Newtonian mechanics that integrates motion into all phenomena in a theory of space.

The Pythagorean Plato was convinced that the power of music lay primarily in its numerical and geometrical relationships. For Plato and the Pythagoreans numbers had an explanatory power that no other system possessed. They were unconditionally rational, defining space, spatial relationships, and infallible linear relationships. To Plato, music's geometric relations place it in a system of definition that relates tuning to the nature of the eternal, immaterial soul and the material world. On the one hand, music was 'about' states of the soul such as bravery or drunken-ness; on the other hand, music served to correlate the soul with the 'harmony of the spheres', that is, a rational, metaphysical Form in infinite space that guides our path in the universe.

The Pythagorean intervals, that is, the octave (2:1), the perfect fifth (3:2), and the perfect fourth (4:3) are fundamental to the construction of the ancient Greek musical scale. I argue that these intervals are indicative of depth in music. In Plato's metaphysics, I show that the way in which ordinary musical harmony 'agrees' in the intervals of the octave, the fifth, and the fourth is a projection of the rational properties of objects or Octaves as instances of Form, and further, the way in which the planets harmonise in their motions.

Aristotle initiated an empirical method and scientific observation to experience. What is observed in the world has a cause that explains its motion internal to its 'being'. The description of the *internal* 'being' of a substance is explained by the way it functions as a description of that thing's essence. This claim is explored in its ancient and in its modern context. In its ancient context, the discussion arises

concerning the nature of the soul, perception, and the achievement of purpose. In a modern context, linguists suggest that a tonal language is generated in a way similar to a spoken language. I aim to show that this functionalist account of hearing, namely, that we are 'hard-wired' by language practice to understand and follow music, is ultimately unsatisfactory. I claim that the way in which we understand how a language functions is not sufficiently correlative to hearing absolute music.

Further, contrary to Plato's interest in geometry, infinite space, and *chora*, Aristotle held a container theory of the universe, that is, that change of surface/place or *topos* is a valid category of explanation of the 'being' of a thing. The sole explanation of 'being' *external* to itself is by the study of its place and motion as change of place (*topos*). This theory of change is ultimately attributed to a temporally determined primary cause, the Unmoved Mover. Ultimately I will show Aristotle's account of motion to be a temporal account, and not a spatial one. Nevertheless, interesting questions are raised in relation to the role of the listener, space, and spatial location that are developed in the work of later metaphysicians, particularly Descartes and Newton.

Early in his career Descartes wrote *Compendium Musicae*, a monograph on the musical scale and the laws of counterpoint. In this brief work Descartes already displays some of the ideas he would develop later in his career, in particular, the idea that space is structured as geometric extension. In *Compendium* Descartes asserts that the harmonic series is evidence of proper spatial extension. He shows that the possibility of a proper, sympathetic resonance of tones, or timbre, that had only recently been discovered by an acquaintance of Descartes', Fr. Marin Mersenne, is co-extensive with the notion of geometric space. Further, I investigate Descartes' claims in *Meditations* that as a rational judgement of music is aligned with the rational

deduction of geometric extension by the intellect, a first-hand experience that supports the judgement of music is also true. Descartes' finding is central to my account of the ineffability of music and the infinite depth of the perfect intervals, for it reaffirms a rational, geometric structure to space, and the possibility of infinite depth, although it would require the genius of Newton to prove that geometry was ultimately adequate to the task of defining such 'absolute' space and infinite depth.

From a static, rational concept of timbre in Cartesian philosophy, the philosophy of Leibniz takes the concept of space to its limit. Leibniz views the whole worldly system, that is, particulars, perception, the specious present, concepts, fictions, minds, substances, and laws of nature as one great interconnected corpus of 'substantial forms' that unfolds according to God's rational plan. With the notion of 'substantial form' comes the associated notion of expression. In considering music from this point of view, according to Leibniz, there is something impressive, an idea, or a belief, that causes the expressive nature of music.

Whereas Descartes affirmed the rational nature of space, it is Leibniz who reconstructs the Platonic concept of space as an *infinite* background or 'spatiality'. His notion of spatiality is the notion of the great, relative nature of things. Generating this great corpus is one, single underlying physical concept, dynamics. All things are in a dynamic relation with everything else, and ultimately the whole process is aimed towards God. The conceptual format that infuses Leibniz's metaphysics is the idea of the vanishing limit. In a quest to satisfy the demands of appetite, fed by the dynamic principle of substance, objects or bodies move to a limit, resist motion, and then move again in another direction and velocity. Ultimately these motions in relative space are couched in God's conceptual experiment of the best of all possible worlds.

Leibniz was perhaps the first philosopher to embrace a computational, binary language, that is, ‘yes/no’, on/off’, or ‘0/1’. The binary model is now fundamental to computers and information-processing technology. Although Leibniz abandoned his nascent binary system, it is this kind of system of information-processing that Marr employs in his phenomenological account of vision and the perception of surface geometry. Marr’s computational method of input, algorithm, and output, which can be traced back to Leibniz, is a method of describing perception that is applicable to my formulation of an account of hearing.

Finally, Newton refined Leibniz’s unwieldy account of spatiality. He embodied a scientific approach by deducing laws of motion from models of the repeated observation of phenomena. In Newton we find a culmination of Platonic and Aristotelian methods in arguing from geometrically devised models derived from observations of the lived world. Newton’s model of gravitational force gives the greatest scope to explaining music, although the application is necessarily indirect. Central to my spatial account of music is Newton’s separation of accounts of motion into theories of ‘absolute’, infinite space and ‘relative’, kinematic space.

In general, I assert that the conceptual and phenomenological relation of music and space go some way toward presenting a case for the ineffability of music. In this thesis, by elucidating the ineffable in music by spatial perception, I show that fresh grounds for a philosophy of music and for renewed inquiry into other related areas such as neuroscience, music composition, and architecture have been offered substantial appeal and strength.